

# 2009 CALIFORNIA CLIMATE ADAPTATION STRATEGY

First Year Progress Report  
to the Governor of the State of California



## FOREWORD

Less than one year ago the Natural Resources Agency released the 2009 California Climate Adaptation Strategy, California's first-of-its-kind multi-sector strategy to help guide the state's efforts in adapting to climate change. The fact of the matter is that regardless of how successful we are at mitigating the greenhouse gases which contribute to climate change, serious climate-related impacts are unavoidable in California and we must be ready to respond.

The Natural Resources Agency provided the leadership and coordination that kept state agencies focused on risk assessment and climate change adaptation, but individual departments throughout the State of California, academia and other non-governmental partners deserve credit for making substantial progress in just twelve months. This rate of action bodes well for the new normal in managing not just our natural resources in the face of climate change, but also in planning for public safety, infrastructure development and the future of our state's strong agricultural economy. It has been an honor to watch some of California's best and brightest work together on such a massive undertaking.

Planning for and positioning California to respond to these climate-related impacts is by all means a significant challenge and we have much to learn as we move forward. However, California's capacity for leadership is boundless and by working across sectors and jurisdictions, in government and outside of government, I am confident that we can make great strides in protecting California's economy and its environment.

My sincere thanks to all who have contributed to our accomplishments to date as spelled out in the 2010 Progress Report that follows.



Lester A. Snow  
Secretary for Natural Resources

# California Climate Adaptation Strategy

## 2010 Progress Report

### Executive Summary

Climate change presents a serious threat to many of the resources upon which Californians rely. A recent study by Next 10 estimated the total risk to California assets from climate change at \$2.5 trillion. Continuing to address this growing challenge, Governor Schwarzenegger signed an Executive Order<sup>1</sup> in November 2008 directing the California Natural Resources Agency (CNRA) to develop a climate adaptation strategy for California. During the ensuing year, CNRA coordinated with ten different state agencies, scientists, a consulting team, and public stakeholders to develop the first statewide, multi-sector adaptation strategy in the country. On December 2, 2009, CNRA released the *2009 California Climate Adaptation Strategy* (Adaptation Strategy or CAS), available at <http://www.climatechange.ca.gov/adaptation/>. The following document describes the progress California has made during 2010 to complete the tasks outlined in the Adaptation Strategy.

### Progress to Date

The Adaptation Strategy is divided into two main parts. Part I begins with an introductory chapter that defines climate adaptation and its relation to climate mitigation. A science chapter follows and provides a synthesis of the Public Interest Energy Research (PIER) into statewide climate impacts. A third chapter (Comprehensive State Adaptation Strategies) is devoted to those strategies that address topics applicable to all sectors such as land use, research and emergency preparedness. Part II, the remainder of the Adaptation Strategy, consists of chapters organized into the seven sectors selected for evaluation: public health, biodiversity and habitat, oceans and coastal resources, water management, agriculture, forestry, and infrastructure.

#### ***Part I: Key Recommendations and Comprehensive State Adaptation Strategies***

The CNRA has overseen the implementation of the following key recommendations provided in the Adaptation Strategy Executive Summary, with particular focus on the following subject areas:

##### **The Climate Adaptation Advisory Panel (CAAP):** *(CAS Key Recommendation 1)*

The CAAP consists of a panel of prominent business, labor, government, and private sector leaders convened in December 2009 to prioritize state adaptation actions. The CAAP operated independently, but coordinated regularly with CNRA. The CAAP report will be released on November 22, 2010, and will be available on the Web at [www.pacificcouncil.org/](http://www.pacificcouncil.org/). The CAAP report focuses on three of the seven sectors covered in the Adaptation Strategy – sea level rise, water supply and forest wildfires – and validates and supports the Adaptation Strategy recommendations in those three sectors.

##### **California Environmental Quality Act (CEQA) guidelines:** *(CAS Key Recommendation 5)*

In addition to releasing the Adaptation Strategy, CNRA, in cooperation with the Governor's Office of Planning and Research (OPR), finalized amendments to the CEQA Guidelines, in particular amending Guideline Section 15126.2. As amended, this section directs public agencies to

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<sup>1</sup> Executive Order S-13-08 signed by Governor Schwarzenegger on November 14, 2008.

consider potentially significant impacts to the environment that could result if development is located in areas particularly sensitive to the effects of climate change. Thus, just as entities analyze the unique environmental impacts that could arise from locating development on, for example, an active fault line, this amendment now requires concomitant consideration for locating development in areas prone to environmental hazards such as sea level rise or catastrophic wildfire. This critical regulatory change addresses potential hazards and environmental impacts that could be exacerbated by climate change, thereby seeking to ensure potential impacts are mitigated where feasible. However, what most public entities continue to need are data and direction on how best to protect the public from the risks associated with climate change. This is why CNRA has made the development of climate vulnerability research and planning tools a top priority.

**Climate Vulnerability Study:** *(CAS Key Recommendations 3, 5, 6, 9, and 12)*

The CNRA has been coordinating with the California Energy Commission (CEC) to provide funding and direction for a vulnerability study. This study builds upon years of state-specific climate research findings to determine how California's natural, economic and social systems are vulnerable to expected climate impacts. This study focuses on the regional scale because, as the Adaptation Strategy acknowledges, most climate adaptation decisions will take place at the regional or local levels.

**CalAdapt:** *(CAS Key Recommendation 12)*

During the past year, CNRA has been working with the CEC, University of California, Berkeley, and Google to develop CalAdapt, a Web-based adaptation planning tool. This tool allows the user to identify potential climate change risks in specific geographic areas throughout the state. Users can click any location on an interactive map of California and see what future climate impacts are likely to occur.

**Climate Adaptation Policy Guide:** *(CAS Key Recommendations 6 and 9)*

The CNRA has made substantial progress working with the California Emergency Management Agency (CalEMA) to develop a Climate Adaptation Policy Guide that will be completed in 2011. Funded by a \$400,000 federal grant, the policy guide will provide a decision-making framework for use by state, regional, local, and private organizations to help interpret climate science for local impacts and to translate that science into action.

**Sea Level Rise Study:** *(CAS Key Recommendation 3)*

Working with the Department of Water Resources (DWR), the Ocean Protection Council (OPC), and other agencies, CNRA has helped to commission a National Research Council study to assess sea level rise risk for California, Oregon and Washington. Study design is currently underway. When the study is completed in 2012, it will provide an estimated range of values for sea level rise for the years 2030, 2050 and 2100. These estimates can be used by the public and private sectors to better plan for sea level rise impacts. The OPC, meanwhile, convened a multi-agency Sea Level Rise Task Force, which developed an interim guidance document based on the best available science to assist state agencies in developing approaches to incorporate sea level rise into planning decisions prior to the release of the NAS report.

**Part II: Implementing the CAS Sector Strategies**

The CNRA has provided coordination and support for the working groups that retain primary responsibility for implementing each sector strategy. Soon after the Adaptation Strategy was released, agency staff from the sector adaptation working groups began working with the Climate Action Team (CAT) as part of an effort to implement and report on near-term adaptation strategies.

The Adaptation Strategy organized state agencies into seven resource-based sector working groups. Each working group identified preliminary adaptation strategies that could be implemented in the short term (by December 2010) and longer term. This report focuses on the near-term progress made by the following seven sectors, through October 2010:

- Public Health
- Biodiversity and Habitat
- Oceans and Coastal Resources
- Water Management
- Agriculture
- Forestry
- Transportation and Energy Infrastructure

### **Public Health**

The Public Health Working Group (PHWG), chaired by the California Department of Public Health (CDPH), meets at least quarterly and consists of state agency staff, stakeholder groups, researchers, and local health departments. Heat was identified as a top risk factor and priority for early action. The CDPH is seeking grant funding to address heat aspects of climate change.

The CDPH completed a Health Impact Assessment guide to be posted on the department's website. This guide provides public health professionals and regulatory agency staff information on the process of assessing various health impacts of proposed policies, projects and regulations. The guide can be helpful in assessing proposed climate change mitigation and adaptation efforts. Additionally, the CDPH, with support from the Pew Center on Climate Change, and in collaboration with stakeholders and the California Air Resources Board (CARB), has conducted a health impact assessment of the CARB's proposed Cap and Trade plan. This assessment will be completed in late 2010.

The CDPH has also worked to increase communication with other CAT working groups on various aspects of health and vulnerability. Last April, the PHWG held a panel, consisting of the U.S. Environmental Protection Agency, CDPH's Health Tracking Program, Lawrence Berkeley Lab, and CalEMA, on the health impacts of heat, surveillance and climate change challenges. The CDPH is currently conducting a study of the health benefits of increased "active transportation," replicating a high-profile study conducted by researchers in London in 2007 – 2009.

Finally, the CDPH is working to develop climate communication strategies and messages, beginning with two workshops featuring Dr. Ed Maibach, on communicating climate change as a public health issue, scheduled for November 2010. The CDPH is expanding its Environmental Health Tracking Program to include a set of climate change and health indicators recommended by the National Council of State and Territorial Epidemiologists. The CDPH is committed to enhancing the state's understanding of and response to the human health vulnerability and equity dimensions of climate change.

### **Biodiversity and Habitat**

The Department of Fish and Game (DFG) has created a stakeholder Biodiversity and Habitat Group, consisting of federal, state, NGO, industry, and academic leaders, that meets bi-annually. The stakeholder group's focus is to develop a collective vision for how DFG should conduct its climate change activities. The group dynamic produces a sense of ownership that will better facilitate the implementation of climate change adaptation efforts. The stakeholder group has since split into three working groups: Outreach, Research and Workshop, and Policy. In the

summer of 2010, DFG began outreach to all partners about the results of DFG's Areas of Conservation Emphasis mapping and modeling effort.

The Outreach Workgroup is creating a public-information magazine that will be available in December 2010. Also, in November 2010, the Research and Workshop Workgroup held a workshop on downscaling climate change models. The Policy Workgroup is participating as a focused stakeholder group as DFG revises the California Wildlife Action Plan (due in 2015) to more comprehensively incorporate climate change and adaptation planning priorities.

Moving forward, CNRA will work with the Biodiversity and Habitat Group to provide cross-sector oversight and to facilitate collaboration and communication among sectors.

### **Ocean and Coastal Resources**

The Ocean and Coastal Resources sector is focused on the multi-agency Sea Level Rise Task Force, which has released an interim guidance document to assist state agencies and other interested parties in developing approaches for incorporating sea level rise estimates into planning decisions.

The OPC is charged with coordinating ocean-related activities across state agencies and funding ocean-related projects. Composed of the secretaries of CNRA and the California Environmental Protection Agency (CalEPA), the chair of the State Lands Commission, two governor's appointees, and one member each from the California State Senate and State Assembly, the OPC provided \$2.5 million for light detection and ranging (LiDAR) shoreline elevation data collection, mapping and interpretation. Mapping products will be made publicly available starting July 2011 and will help coastal communities plan for the impacts from sea level rise. The state is also coordinating with the National Oceanic and Atmospheric Administration, the U.S. Army Corps of Engineers, and the U.S. Geological Survey to encourage federal funding of high-resolution mapping projects for coastal areas.

Additionally, the OPC is developing its next five-year strategic plan and climate adaption is one of the five focal areas of this plan. The OPC will work with the OPC Steering Committee, the OPC Science Advisory Team, and interested stakeholders to prioritize needs and develop an action plan for adapting to climate change.

In early 2011, the State Coastal Conservancy (SCC) will release a guidance document on interpreting SCC Climate Change Policy, addressing habitat protection, and funding projects that identify priority shoreline acquisition and restoration projects. In December 2010, the San Francisco Bay Conservation and Development Commission will consider an amendment to the San Francisco Bay Plan to support climate impact habitat protection. The California Coastal Commission is considering broader application of Coastal Act policies in light of the latest science on climate change impacts.

The Oceans and Coastal sector will continue to work with the Climate Action Team, fostering interagency connections. In addition, the National Academy of Science's Sea Level Rise Assessment Report will be completed in early 2012 and will update the best available science on projected sea level rise and its impacts.

### **Water Management**

In March 2010, DWR released the *California Water Plan Update 2009*, the state's strategic plan for water resources, in which climate change plays a central role. In fact, *Update 2009* specifically includes all of the water-sector recommendations from the Adaptation Strategy as well as the water-related measures contained in the AB 32 Scoping Plan. Overall, the plan calls

for the implementation of a diversified, integrated portfolio of strategies to lead California to a more sustainable water future.

One such strategy is the “20 x 2020” Water Conservation Plan, issued in February 2010. It is called for by SB7X 7, to achieve a statewide 20 percent per capita reduction in urban water use by 2020, and requires reporting for implementing agricultural water use efficiency. The Comprehensive Water Package legislation, signed by the Governor in November 2009, for the first time required monitoring of groundwater elevations throughout California, and the establishment of a new governance structure for the Sacramento-San Joaquin Delta.

DWR is also sponsoring a new round of grant-making to help further implement Integrated Regional Water Management (IRWM), using funds from Proposition 84. In July 2009, DWR released funding guidelines and proposal solicitation packages that require potential grantees to substantively consider climate change mitigation and adaptation in their funding applications. In 2011, local water utilities that file Urban Water Management Plans with DWR will need to meet a similar requirement. DWR has explicitly incorporated climate change adaptation into its other planning processes as well, including the Central Valley Flood Protection Plan and all documents issued by DWR pursuant to CEQA. Moreover, the department is developing a Climate Action Plan which will provide for programmatic coverage of most DWR activities, for compliance with the new CEQA guidelines on climate change.

DWR is also engaged in a variety of research projects related to climate change, including studies on paleohydrology (using tree-ring data to reconstruct stream flows in the Sacramento, San Joaquin and Klamath River Basins), subsidence reversal and tidal marsh restoration in the Sacramento-San Joaquin Delta, and upper meadow restoration in the Sierra Nevada Range (in partnership with the U.S. Forest Service). DWR also continues to house and support California’s official State Climatologist’s Office.

On Earth Day 2010, DWR and the Sacramento Municipal Utilities District (SMUD) jointly announced a new partnership in which SMUD will provide 33 percent renewable energy and 33 percent carbon offsets for DWR’s retail electrical and natural gas use, respectively. In addition, the State Water Project has adopted a Renewable Energy Procurement Plan for its operations. In September 2010, DWR established sustainability targets for all its operations and programs, including a 20% reduction in water use and a 50% reduction in carbon emissions by 2020 (relative to its 1990 baseline). For the past three years, the California Climate Action Registry has named DWR a “Climate Action Leader” for annually calculating, disclosing and independently verifying its carbon footprint.

DWR and the State Water Resources Control Board continue to co-chair the Water-Energy Subgroup (“WETCAT”) of the Governor’s Climate Action Team. By early 2011, the state will develop and post a database for stakeholder information on water conservation, water recycling and stormwater capture/use. This year, the WETCAT also received a report from UC Berkeley’s Goldman School of Public Policy regarding the implementation of a public goods charge for water, to provide for sustainable funding for water management, as called for in both the *AB 32 Scoping Plan* and the *California Water Plan Update 2009*.

DWR also remains active in climate change public outreach in many formats – in person, print, video, and on the web. In 2010, the Department initiated a new online “Climate News” feature, a regular digest of climate news and science, at [www.water.ca.gov/climatechange/news.cfm](http://www.water.ca.gov/climatechange/news.cfm). In September 2010, DWR also released a summary of its overall climate change achievements, which is available at [www.water.ca.gov/climatechange](http://www.water.ca.gov/climatechange).



## **Agriculture**

The California Department of Food and Agriculture (CDFA) is focused on adaptation strategies needed to address the problem of decreasing water supplies and infestations of invasive species. First, addressing water conservation, CDFA has entered into two research contracts for yield optimization with reductions of applied water: (1) a UC Riverside study on optimization of irrigation water with applied foliar fertilization; and (2) a study to improve nitrogen use efficiency with drip irrigation.

Second, the Invasive Species Council of California has assembled a California Invasive Species Advisory Committee with representatives from academia, natural resources agencies, environmental organizations, and the business community to develop a priority list of potential invasive pests and to develop an action plan to treat the problem.

Third, CDFA has partnered with the UC Biomass Collaborative, along with funding from the CEC, for a study to advance the scientific understanding of crop-based biofuel production strategies for California's environmental and agricultural systems. Finally, CDFA plans to conduct workshops in 2011 to introduce farmers and other agricultural interests to available adaptation technologies and to share success stories.

## **Forestry**

The Forestry sector has made progress on most of its reported strategies and actions. The Department of Forestry and Fire Protection (CAL FIRE) completed its 2010 Forest and Resource Assessment Program (FRAP), incorporating new fire hazard severity zone maps and climate projections to identify priority landscapes where forest and range resources are at risk from climate change. The FRAP also examines opportunities for high priority fuel reduction activities, which are needed to reduce wildfire hazard and can also support woody biomass for bioenergy production. This provides the co-benefits of reduced fossil fuel uses, improved forest health, and wildfire reduction. The final version is now available online at <http://frap.cdf.ca.gov/assessment2010.html>

The Board of Forestry and Fire Protection (BOF) completed the 2010 Fire Plan, which recognizes the role of climate in increasing the risk of and potential damage from wildfires. The plan supports adaptation objectives for creating more resistant and resilient forests and communities, identifying local and regional actions to improve wildfire risks and hazard risk reduction, and improve land use planning and emergency response planning.

The BOF is also the lead for the Climate Action Team's Interagency Forestry Working Group (IFWG), which has been conducting an ongoing dialogue on climate change implications for forest policy and programs and on issues related to forest adaptation initiatives, such as the utilization of forest biomass for energy. The IFWG held a public workshop in June 2010 with the USFS to examine how rules, regulations and planning processes provide for sustainable forest management and for maintaining carbon stocks and GHG sequestration benefits. The IFWG also held a field tour with CEC to look at the effects of fuels management on forest health, forest resilience and availability of bioenergy feedstocks.

CAL FIRE continues to work with state agencies including DFG, State Parks, Sierra Nevada Conservancy, Tahoe Conservancy, and with local entities such as Fire Safe Councils, Resource Conservation Districts, landowners, and governments to identify hazards and risks to urban interface and wildland areas. CAL FIRE is also involved in ongoing fuels management activities to restore fire resistant forest conditions and reduce potential wildfire damage through state bond funds and federal grants. Activities include manual, mechanical, herbivory, and prescribed fire treatments. Proposition 40 grants, directed to reduce potential fire impacts to watersheds, will



continue for one more fiscal year (2010/11). CAL FIRE is also developing carbon calculators for use by the department and landowners for timber harvest, timberland conversion and fuels management.

CAL FIRE's Urban Forestry Program will assist local entities with tree planting and urban forest management through funding from Proposition 84. It is anticipated the grants will be delivered by spring 2011.

## **Infrastructure**

The Infrastructure Sector is divided into Energy and Transportation, each addressed below:

### *Energy*

The CEC has made great strides in moving the state toward its ambitious renewable energy goals. As of November 2010, the CEC licensed eight large-scale solar thermal projects that will provide nearly 3,500 MW of renewable electricity generation capacity. Three have started construction. One of the projects, the 1,000 MW Solar Millennium Project in Blythe, California, will be one of the largest solar energy facilities in the world. The CEC is reviewing permit applications for an additional four solar thermal projects that would add another 950 MW, and additional solar thermal projects are planned in the foreseeable future. The CEC is encouraging the development of renewable electrical generation and transmission infrastructure in the least sensitive environmental areas to maintain natural habitats that will buffer the impacts of climate change.

Attaining the energy efficiency goals in AB 32, as well as facilitating access to local, decentralized renewable resources has been well under way, with programs for Investor-Owned Utilities and Publicly Owned Utilities, and building codes and appliance standards. The CEC issued a report at the end of 2009, *Committee Guidance on Fulfilling California Environmental Quality Act Responsibilities for Greenhouse Gas Impacts in Power Plant Siting Applications*, which includes recommendations on reasonable adaptation measures in power plant siting.

Further, a CEC research contract with Lawrence Berkeley National Laboratory will be completed by the end of 2010 that will assess climate change impacts on energy infrastructure from sea-level rise, precipitation, temperature changes, and other impacts.

Similarly, UC Berkeley is developing an energy-use "hotspot" map that will identify areas in the state where increases in temperature, population and energy-use will make communities most vulnerable to climate change impacts. This map is slated for completion in late 2011.

Finally, a research project between the CEC and DWR is now complete and under final review. It is designed to help improve management of existing major water reservoirs in California to adapt to current levels of climate variability to reduce flood risk and maximize timing for water supply, fisheries management and more.

### *Transportation*

A contract was signed in July 2010 with UC Davis to examine available data and studies and to identify areas of high vulnerability to impacts to the state's freeway and highway system as a result of climate change. From this review, transportation climate change hotspot locations will be mapped. These hotspots will be locations in which population, travel demand and climate change effects intersect to create vulnerabilities that will potentially need to be addressed. GIS-based assessment of transportation infrastructure vulnerabilities, using available data and

studies, will identify critical transportation hotspots. The maps should be available by March 2012. Caltrans is actively involved in working with other state government representatives on climate change related activities including: the update of the CEQA Guidelines, the development of interim sea level rise assumptions for state agencies, and the preparation of guidelines to address sea level rise in preliminary engineering documents for transportation projects.

## **Other State and Federal Efforts**

### *Strategic Growth Council*

In September 2008, Governor Arnold Schwarzenegger signed SB 732 (Steinberg), creating the Strategic Growth Council (Council). The Council is a cabinet-level body tasked with coordinating the activities of state agencies to protect the natural and human systems vital to California. The Council focuses on air and water quality, housing, infrastructure, and lands with high ecosystem and agricultural values and their associated benefits to public health.

The Council is also responsible for addressing climate change by helping to meet AB 32 goals through assisting state and local entities in the planning of sustainable communities. Currently, the Council is required to distribute information to local governments to assist these entities in developing sustainable communities.

The Council is responsible for two competitive grant programs. The CNRA is administering a competitive grant program for Urban Greening projects and plans while the Department of Conservation is administering a competitive grant program for sustainable community plans. Eligible projects include preparation of local climate adaptation plans, or an adaptation planning component to a sustainable communities plan. The CNRA is actively involved in coordinating the review and approval of grant applications. In September 2010, 14 Urban Greening planning grants totaling \$3.8 million were awarded. Approximately \$55 million in Sustainable Community Planning grants will be awarded by the end of 2010.

### *Federal Government*

The CNRA continues active coordination with federal agency climate adaptation efforts, primarily through the Western Governors Association (WGA) and the President's Council on Environmental Quality (CEQ).

In June, the WGA released a report entitled *Climate Adaptation Priorities for the Western States*, which outlines recommendations for working with the federal government, particularly in matters of legislation and research. The CNRA helped draft this report and will follow through on the report's recommendations to ensure federal adaptation efforts take into consideration the needs and existing progress California and other participating states are making with climate adaptation. The report is available through the WGA website at [www.westgov.org](http://www.westgov.org). CNRA is also working with WGA to develop tools, resources and expertise needed for western states to better incorporate climate change into their own planning efforts.

On October 14, the CEQ released a progress report for recommendations on a national climate adaptation strategy, available online at [www.whitehouse.gov/administration/eop/ceq/](http://www.whitehouse.gov/administration/eop/ceq/). The CNRA provided input into this effort, and will be involved with developing the next progress report in 2011.

**Conclusion**

The State of California is engaged in an ongoing process of adapting to climate change. The California Natural Resources Agency is taking a leadership role in coordinating the activities of a wide variety of state agencies. While the Adaptation Strategy covers a broad range of activities, CNRA is focused on providing the guidance needed for the public and private sectors to enable planners and decision makers to prepare for climate impacts.